

DISCUSSION OF THE AMENDMENT

Claims 1-12 are active in the present application. Claim 8 is amended for matters of form. Claim 9 is a new independent claim. Claims 10-12 are new dependent claims. Support for new independent Claim 9 is found in original Claim 1 and throughout the specification. Support for new Claims 11-12 is found in the examples.

No new matter is believed to have been added by this amendment.

REMARKS

The Office rejected the claims of the preliminary amendment as obvious over Ostrowicki (US 5,910,534) in combination with Basu (US 4,458,057). The European equivalent of Ostrowicki (i.e., EP-B 819708) is discussed in the present specification on page 1, lines 34-45. The Ostrowicki process is disclosed to suffer from a severe disadvantage:

A disadvantage of that process is that the resulting copolymer dispersions contain coagulum in amounts which interfere with the application of the aqueous copolymer dispersions in various fields of application and which must therefore be separated off in expensive and time-consuming filtration operations.

The presently claimed invention is drawn to a process for carrying out a free radically initiated emulsion polymerization of an aqueous monomer mixture that contains carboxylic acid group-containing monomers. In the claimed invention, a portion (up to 50%) of the carboxylic acid groups of a carboxylic acid group-containing monomer are neutralized before the monomer is polymerized.

Ostrowicki describes a process that is substantially different from the process recited in the present claims. The Ostrowicki process is described as solving problems regarding the stability and/or shear strength of certain dispersions. Ostrowicki discloses certain stability and shear problems in column 1:

The stability of such systems to multivalent ions, for example, to calcium ions, is frequently unsatisfactory, particularly at elevated temperatures and under the action of shear forces. To overcome this disadvantage, in prior art monomers which bring about a so-called "steric stabilization" through the incorporation of hydrophilic groups were often used concomitantly in the polymerisation.

See column 1, lines 35-41 of Ostrowicki.

The Office acknowledges that Ostrowicki does not disclose neutralizing up to 50% of the carboxylic acid groups of a carboxylic acid group-containing monomer prior to polymerization. It appears, however, that the Office is of the opinion that Ostrowicki suggests

that up to 50% of the carboxylic acid groups of the Ostrowicki may be neutralized prior to their addition to a polymerization reaction.

Applicants submit that Ostrowicki does not in fact disclose or suggest that any amount of the Ostrowicki monomers may be neutralized prior to being added to the Ostrowicki polymerization. In fact, the carboxylic acid groups that are not neutralized during the Ostrowicki polymerization are not neutralized at all. This is evident, for example, from the examples of Ostrowicki in which the polymer dispersions formed by polymerizing must be neutralized subsequent to polymerization. For example:

After the polymer dispersion formed had cooled to room temperature, the pH value was adjusted to pH 7.0 with ammonia water and a solids content of 50% was established by adding water.

See column 5, lines 57-60.

As described in the above-quoted text from Ostrowicki, it is necessary to add a base to the dispersions formed in the Ostrowicki examples to achieve neutralization subsequent to polymerization (e.g., to achieve a pH of 7.0). Because a base must be added after the polymerization, it is evident that neutralization occurs subsequent to polymerization, not prior to polymerization as presently claimed.

At best, Ostrowicki discloses that up to 50% of the monomers may be neutralized during polymerization but does not disclose or suggest that any of the monomer may be neutralized prior to polymerization. Ostrowicki describes only that a certain portion of the monomers are neutralized; namely, the portion that is neutralized during the polymerization. There is no disclosure or suggestion that any acid groups are neutralized at any point before the polymerization of Ostrowicki.

It is therefore evident that Ostrowicki in no way discloses neutralizing before polymerizing.

The Office relies on Basu to cure this deficiency of Ostrowicki. At the outset, Applicants submit that Basu is different from the presently claimed invention because Basu relates to processes for polymerizing vinyl chloride monomers, e.g., monomers that do not contain acid groups. Basu makes it clear that the disclosure of the Basu patent relates to vinyl chloride and not an acid group-containing monomer. See, for example, column 1, lines 6-10:

Many polymerizable monomeric materials, and particularly vinyl chloride, are being polymerized today on a large scale commercially either in suspension media or in aqueous dispersion or emulsion, that is, latex form,

Moreover, contrary to the presently claimed invention, Basu describes a process that includes neutralizing a carboxylic acid group-containing polymer, not a monomer. For example:

An important aspect of the instant invention is the water-insoluble suspending or dispersing agent that is employed in order to stabilize the dispersed monomer droplets against coalescent. The dispersing agent employed is an unneutralized crosslinked interpolymers of one or more carboxylic acid monomers with a polyunsaturated compound having a plurality of terminally unsaturated polymerizable groups, ...

See column 3, lines 42-46 of Basu.

In Basu, a carboxylic acid group-containing polymer is neutralized by the addition of a base. This is contrary to the requirement of the present claims which require that the acid groups of a carboxylic acid group-containing monomer are neutralized prior to polymerization. Therefore, Basu does not disclose a process in which the carboxylic acid groups of a monomer are neutralized before the monomers are polymerized to form the polymer.

The Office asserts that Basu teaches that neutralizing monomer-containing dispersions is a way to reduce polymer buildup on reactor walls (see the paragraph bridging pages 4 and 5 of the March 19, 2008 Office Action). The Office further asserts that

neutralization of the prior art polymerization reaction medium occurs prior to the start of the polymerization reaction.

Applicants submit that the Office mischaracterizes the disclosure of Basu and inappropriately relates Basu to the presently claimed invention. At best, Basu discloses neutralizing an emulsifier. The emulsifiers of Basu are not carboxylic acid-containing monomers but are, instead, acid group-containing polymers.

The neutralizing of Basu is substantially different from the neutralizing of the presently claimed invention. Where Basu neutralizes the acid groups of a polymer which is present to act as a dispersant and/or emulsifier, the presently claimed invention neutralizes monomers which undergo polymerization to form a polymer. Applicants submit that it is readily evident that Basu's teaching of the neutralization of a polymer dispersant is substantially different than the presently claimed requirement that monomer compounds are reduced prior to polymerization.

This is emphasized by the disclosure bridging columns 3 and 4 of Basu:

After forming the dispersion or emulsion of the polymerization reaction ingredients and prior to polymerization thereof, it is necessary, and most important to partially neutralize the reaction medium, and mainly the dispersing agent therein, in order to insure the stabilization of the monomer droplets therein during the subsequent stirred reaction period.

The Office's reliance on Ostrowicki and Basu as evidence that the presently claimed invention is obvious is not supportable and the rejection should be withdrawn.

Irrespective that the Office has failed to establish a case of *prima facie* obviousness, Applicants submit that the patentability of the presently claimed invention is further evidenced by superior reduction in coagulum formation. Applicants have shown that a substantial reduction of coagulum is achieved when the polymerization is carried out as presently claimed.

Example 1 and Comparative Example 1 of the specification demonstrate this advantage of the presently claimed invention in comparison to the closest prior art, i.e., Ostrowicki. Comparative Example 1 is carried out according to Ostrowicki. The only difference between the inventive example (Example I) and Ostrowicki (Comparative Example 1) is that partial neutralization is carried out before the polymerizing whereas Comparative Example 1 (Ostrowicki) carries out neutralizing during polymerizing.

In Example 1, an aqueous emulsion polymerization is carried out by adding certain feed streams to a reactor. Feed I includes a base, i.e., a 25% aqueous solution of sodium hydroxide. Feed II includes a carboxylic acid group-containing monomer unit, i.e., acrylic acid. The feeds I and II are added to the polymerization reactor in a manner such that feed I and II are mixed before they enter the polymerization reactor. As described on page 9, lines 18-19, feeds I and II are supplied to the polymerization reactor via a common supply line. Mixing the sodium hydroxide-containing feed I with the acrylic acid-containing feed II, results in partial neutralization (up to 50%) of the carboxylic acid groups of the acrylic acid.

Comparative Example 1 is carried out in the same manner as Example 1 except feeds I and II are separately added to the polymerization reactor (see page 10, lines 24-25). By adding feeds I and II separately, the neutralization of the carboxylic acid groups of the acrylic acid monomer must take place during polymerization instead of prior to polymerization as presently claimed.

When the product of the inventive and comparative examples is isolated, the coagulum formed in the inventive example is at least 35% less than the amount of coagulum formed in Comparative Example 1 (compare 105 ppm versus 165 ppm, respectively). Reducing the amount of coagulum permits faster filtration and more efficient manufacture of the desired polymer.

Applicants have thus shown that carrying out the polymerization of the monomer mixture recited in the present claims by partially neutralizing the carboxylic acid groups of the carboxylic acid group-containing monomer before polymerization, provides a polymerization mixture that has substantially less coagulum in comparison to a process wherein the neutralization of the carboxylic acid groups is carried out during polymerization (e.g., the process described in Ostrowicki).

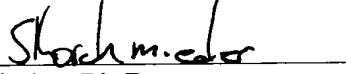
For the reasons discussed above, Applicants submit that the rejections should be withdrawn and all now-pending claims passed to allowance.

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